

TROUBLESHOOTING ENGINE CONTROL QUADRANTS

YOU'RE IN FOR A TREAT!
THIS NEW TEST BOX WILL
MAKE TROUBLESHOOTING
YOUR ENGINE CONTROL
QUADRANTS EASIER!

YOU MEAN NO
MORE FLASH-
LIGHTS AND
MIRRORS?

...AND NO MORE HOURS
OF TRYING TO FIGURE
OUT WHAT'S WRONG
WITH THE QUADRANTS?!

HERE'S
ANOTHER GOOD
SUGGESTION
FROM THE FIELD!

Dear Rotor,

Our mechanics have a tough time and spend hours trying to troubleshoot, test and inspect the Blackhawk's engine control quadrant switches using a multimeter, a flashlight and a mirror. It takes three hands to do it.

The J105 and J106 connectors of the quadrants are mounted in the upper console of the cockpit in a tight space. That makes it difficult to see the pin letters without the aid of the mirror and a flashlight.

The procedure in TM 1-1520-237-23-3, Paras 4-2-8 and 4-2-9, requires continuity, resistance and voltage checks of all pins and micro-switches when we suspect an engine start problem or an ignition system problem.

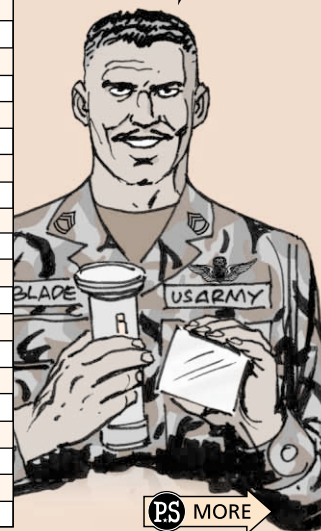
We solved that problem with a new test box that can aid in and speed up the testing and troubleshooting of the engine control quadrant switches. It now takes 5 minutes, and doesn't require the aid of a mirror and flashlight to check the switches.

Any AVIM shop can build the test box. Here are the materials for the control quadrant test box:

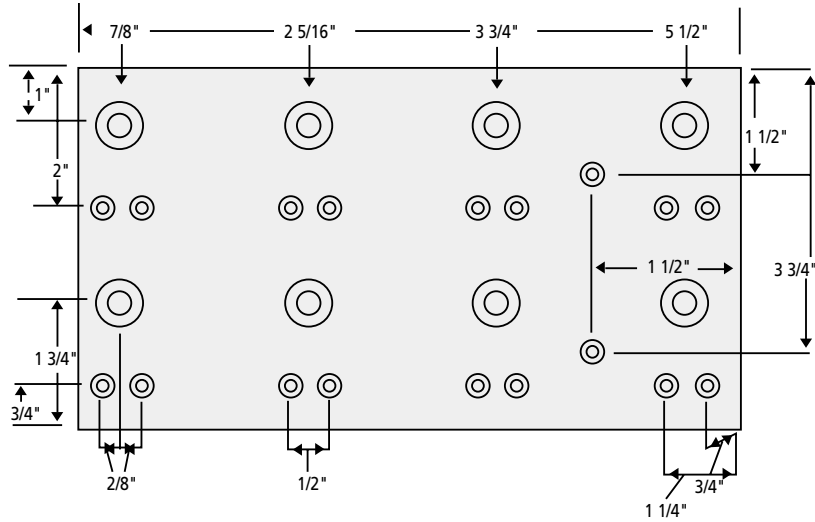
Engine Control Box Parts List

Item name	NSN	Qty
Box, electrical	5975-00-489-1407	1
Socket light (DS1-DS8)	6250-00-813-8265	8
Lens light (red) DS7 & DS8	6210-00-410-2530	2
Lens light (green) DS5 & DS6	6210-00-079-8943	2
Lens light (blue) DS3 & DS4	6210-00-045-5494	2
Lens light (amber) DS1 & DS2	6210-00-080-1048	2
Lamp Incandescent	6240-00-155-7836	8
Test jack (red) K, S, G, & N	5935-00-702-4199	8
Test jack (yellow) J, T, & H	5935-00-768-4232	6
Test jack (blue) M	5935-00-776-4617	2
Test jack (black) B	5935-00-762-0312	2
Grommet	5325-00-291-9366	2
Wire Elec (20 gauge)	6145-00-939-4964	100 ft
100ft Terminal lug	5940-00-827-2653	1
Insulation sleeving	5970-00-543-1156	7 ft
7ft Connector plug (J105 & J106)	5935-01-078-4517	2
Connector plug (P105 & P106)	5935-01-108-4483	2
Connector backshell	5935-01-162-8704	4
Terminal splice	5940-00-271-7741	18
Screw (for ground lug wire)	5305-00-866-0935	1
Nut (for ground lug wire)	5310-00-081-8087	1
Washer (for ground lug wire)	5310-00-515-8058	1
Cable ties		AR

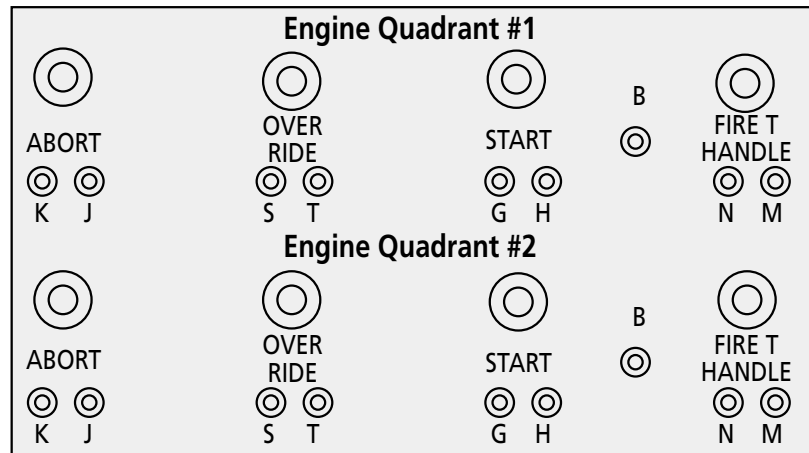
PUT AWAY YOUR
FLASHLIGHTS AND
MIRRORS! USE
THE TEST BOX
INSTEAD!



Drill holes to fit in
the face plate...

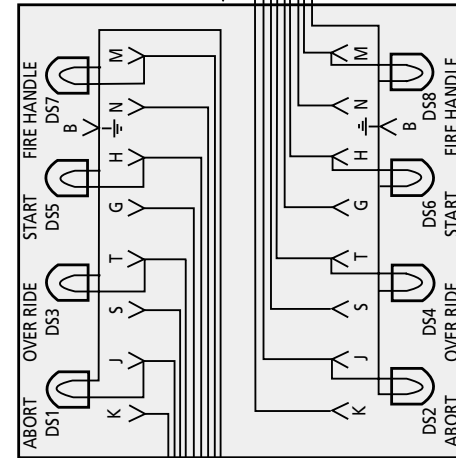


... apply the
labels like so:

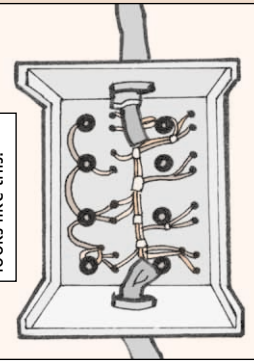


After the holes are
drilled and the face
panel is assembled,
wire the box like so:

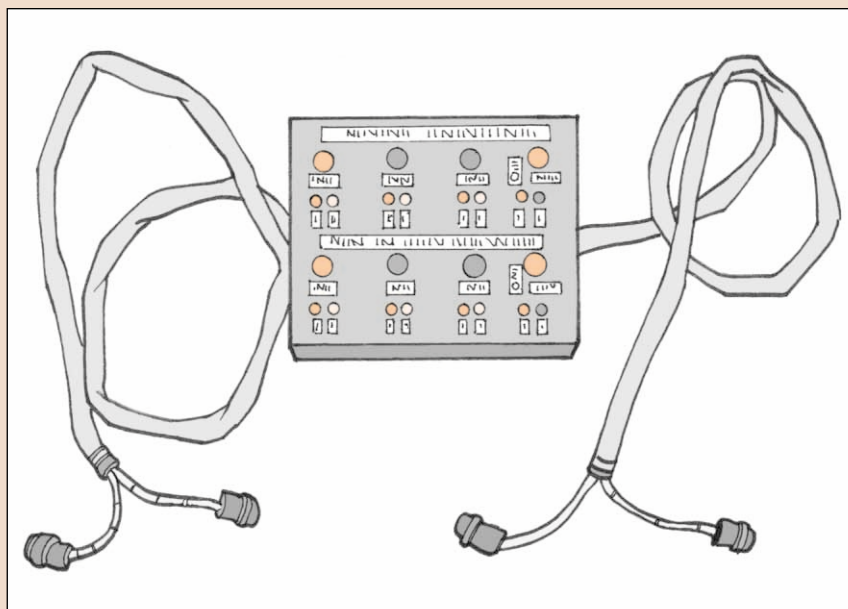
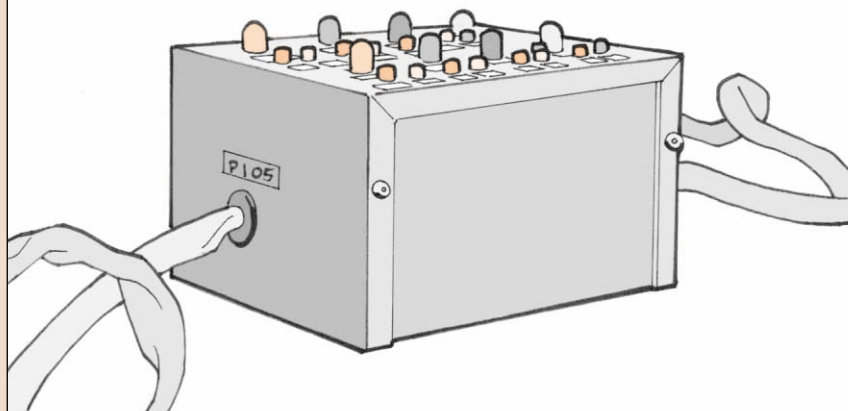
ENGINE CONTROL QUADRANT #1



Wiring inside box
looks like this:



Then assemble the box and you're ready to start testing. Here's what the test box looks like:



If all the switches are operating properly, you will get a light when the start buttons are pushed. To test the engine control quadrants, connect your box in line with the quadrant and follow the engine control test procedures below while troubleshooting. The tables referenced in these procedures are on pages 44 and 45.

Engine Control Test Procedures

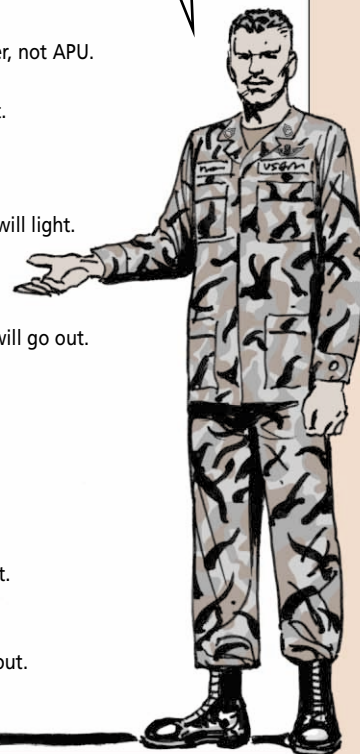
1. Unfasten and lower upper console panel.
2. Disconnect P105 and connect to test box J105.
3. Connect P105 of test box to J105 of aircraft.
4. Disconnect P106 and connect to J106 of test box.
5. Connect P106 of test box to J106 of aircraft.
6. Refasten upper console.
7. Place test box on upper glare shield.

NOTE

Test box used with external power, not APU.

8. Apply external power.
Result: #1 and #2 ABORT lights on test box will light.
 - If #1 ABORT light not lit, go to TABLE NO. 1
 - If #2 ABORT light not lit, go to TABLE NO. 2
9. Depress and hold #1 PCL start button.
Result: #1 START and OVERRIDE Lights on test box will light.
 - If START light not lit, go to TABLE NO. 3
 - If OVERRIDE light not lit, go to TABLE NO. 4
10. Release #1 PCL start button.
Result: #1 START and OVERRIDE lights on test box will go out.
11. Pull down #1 PCL handle and hold.
Result: #1 ABORT light on test box shall go out.
 - If result is not as specified, go to TABLE NO. 5
12. Release #1 PCL handle.
Result: #1 ABORT light on test box will light.
 - If result is not as specified, go to TABLE NO. 1
13. Pull #1 FIRE T HANDLE away from forward detent.
Result: #1 FIRE T HANDLE light on test box will light.
 - If result is not as specified, go to TABLE NO. 6
14. Return FIRE T HANDLE back to forward stop detent.
Result: #1 FIRE T HANDLE light on test box will go out.
15. Repeat steps 9 through 14 above for #2 quadrant.

THE TABLES ARE ON THE NEXT TWO PAGES.



Tables for Engine Test Control Procedure

Table No. 1. #1 abort light does not come on when external power applied.

1. **Check #1 abort bulb in test box.**
Step 1. If bulb is good, go to 2.
Step 2. If bulb is not good, replace bulb, go to 4.
2. **Check #1 abort switch for proper adjustment (PARA 4-4-24).**
Step 1. If #1 abort switch properly adjusted, go to 3.
Step 2. If #1 abort switch not properly adjusted, do (PARA 4-4-24), go to 4.
3. **Check for 28 VDC at #1 Quad test point K and ground.**
Step 1. If voltage as specified, do (PARA 4-2-9), go to 4.
Step 2. If voltage not as specified, troubleshoot aircraft wiring between J105 K and CB312, go to 4.
4. **Procedure completed.**

Table No. 2. #2 abort light does not come on when external power applied.

1. **Check #2 abort bulb in test box.**
Step 1. If bulb good, go to 2.
Step 2. If bulb is not good, replace bulb, go to 4.
2. **Check #2 abort switch for proper adjustment (PARA 4-4-24).**
Step 1. If #2 abort switch properly adjusted, go to 3.
Step 2. If #2 abort switch not properly adjusted, do (PARA 4-4-24), go to 4.
3. **Check for 28 VDC at #2 Quad test point K and ground.**
Step 1. If voltage as specified, do (PARA 4-2-9), go to 4.
Step 2. If voltage not as specified, troubleshoot aircraft wiring between J106 K and CB236, go to 4.
4. **Procedure Completed.**

Table No. 3. Start light does not come on when start button depressed.

1. If checking #1 Quad go to 2. If checking #2 Quad go to 5.
2. **Check #1 start bulb in test box.**
Step 1. If #1 start bulb good, go to 3.
Step 3. If #1 start bulb is not good, replace bulb, go to 8.
3. **Check #1 start switch for proper adjustment (PARA 4-4-23).**
Step 1. If #1 start switch properly adjusted, go to 4.
Step 2. If #1 start switch not properly adjusted, do (PARA 4-4-23), go to 8.
4. **Check for 28 VDC at #1 Quad test point G and ground.**
Step 1. If voltage as specified, do (PARA 4-2-9), go to 8.
Step 2. If voltage not as specified, troubleshoot aircraft wiring between J105 G and CB312, go to 8.
5. **Check #2 start bulb in test box.**
Step 1. If #2 start bulb is good, go to 6.
Step 2. If #2 start bulb is not good, replace bulb, go to 8.
6. **Check #2 start switch for proper adjustment (PARA 4-4-23).**
Step 1. If #2 start switch properly adjusted, go to 7.
Step 2. If #2 start switch not properly adjusted, do (PARA 4-4-23), go to 8.
7. **Check for 28 VDC at #2 Quad test point G and ground.**
Step 1. If voltage as specified, do (PARA 4-2-9), go to 8.
Step 2. If voltage not as specified, troubleshoot aircraft wiring between J106 G and CB236, go to 8.
8. **Procedure Completed.**

Table No. 4. Override light does not come on when override button depressed.

1. If checking #1 Quad, go to 2. If checking #2 Quad, go to 5.
2. **Check #1 override bulb in test box.**
Step 1. If #1 override bulb good, go to 3.
Step 2. If #1 override bulb is not good, replace bulb, go to 8.
3. **Check #1 override switch for proper adjustment (PARA 4-4-25).**

- Step 1. If #1 override switch properly adjusted, go to 4.
Step 2. If #1 override switch not properly adjusted, do (PARA 4-4-25), go to 8.
4. **Disconnect test box connector J105 from aircraft connector P105 and check continuity between #1 Quad test points T and S while depressing override button.**
Step 1. If continuity is present, troubleshoot aircraft wiring between J105 T and J105 S through left hand relay panel, go to 8.
Step 2. If continuity is not present, do (PARA 4-2-9), go to 8.
5. **Check #2 override bulb in test box.**
Step 1. If #2 override bulb good, go to 6.
Step 2. If #2 override bulb is not good, replace bulb, go to 8.
6. **Check #2 override switch for proper adjustment (PARA 4-4-25).**
Step 1. If #2 override switch properly adjusted, go to 7.
Step 2. If #2 override switch not properly adjusted, do (PARA 4-4-25), go to 8.
7. **Disconnect test box connector J106 from aircraft connector P106 and check continuity between #2 Quad test points T and S while depressing override button.**
Step 1. If continuity is present, troubleshoot aircraft wiring between J106 T and J106 S through right hand relay panel, go to 8.
Step 2. If continuity is not present, do (PARA 4-2-9), go to 8.
8. **Procedure Completed.**

Table No. 5. Abort light does not go out when PCL handle is pulled down.

1. If checking #1 abort, go to 2. If checking #2 abort, go to 4.
2. **Check #1 abort switch for proper adjustment (PARA 4-4-24).**
Step 1. If #1 abort switch properly adjusted, go to 3.
Step 2. If #1 abort switch not properly adjusted, do (PARA 4-4-24), go to 5.
3. **Do PARA 4-2-9, go to 5.**
4. **Check #2 abort switch for proper adjustment (PARA 4-4-24).**
Step 1. If #2 abort switch properly adjusted, go to 3.
Step 2. If #2 abort switch not properly adjusted, do (PARA 4-4-24), go to 5.
5. **Procedure Completed.**

Table No. 6. Fire T handle light does not come on when handle pulled away from forward detent.

1. If checking #1 fire T handle, go to 2. If checking #2 fire T handle, go to 5.
2. **Check #1 fire T handle bulb in test box.**
Step 1. If #1 fire T handle bulb good, go to 3.
Step 2. If #1 fire T handle bulb is not good, replace bulb, go to 8.
3. **Check #1 fire T handle switch for proper adjustment (PARA 4-5-17).**
Step 1. If #1 fire T handle switch properly adjusted, go to 4.
Step 2. If #1 abort switch not properly adjusted, do (PARA 4-5-17), go to 8.
4. **Check for 28 VDC at #1 Quad test point N and ground.**
Step 1. If voltage is as specified, do PARA 4-2-9, go to 8.
Step 2. If voltage not as specified, troubleshoot aircraft wiring between J105 N and CB1, go to 8.
5. **Check #2 fire T handle bulb in test box.**
Step 1. If #2 fire T handle bulb good, go to 6.
Step 2. If #2 fire T handle bulb is not good, replace bulb, go to 8.
6. **Check #2 fire T handle switch for proper adjustment (PARA 4-5-17).**
Step 2. If #2 fire T handle switch properly adjusted, go to 4.
Step 2. If #2 abort switch not properly adjusted, do (PARA 4-5-17), go to 8.
7. **Check for 28 VDC at #2 Quad test point N and ground.**
Step 1. If voltage is as specified, do PARA 4-2-9, go to 8.
Step 2. If voltage not as specified troubleshoot aircraft wiring between J106 N and CB253, go to 8.
8. **Procedure Completed.**

**From the desk
of the Editor**

Great idea! The new test box will shorten the troubling troubleshooting.